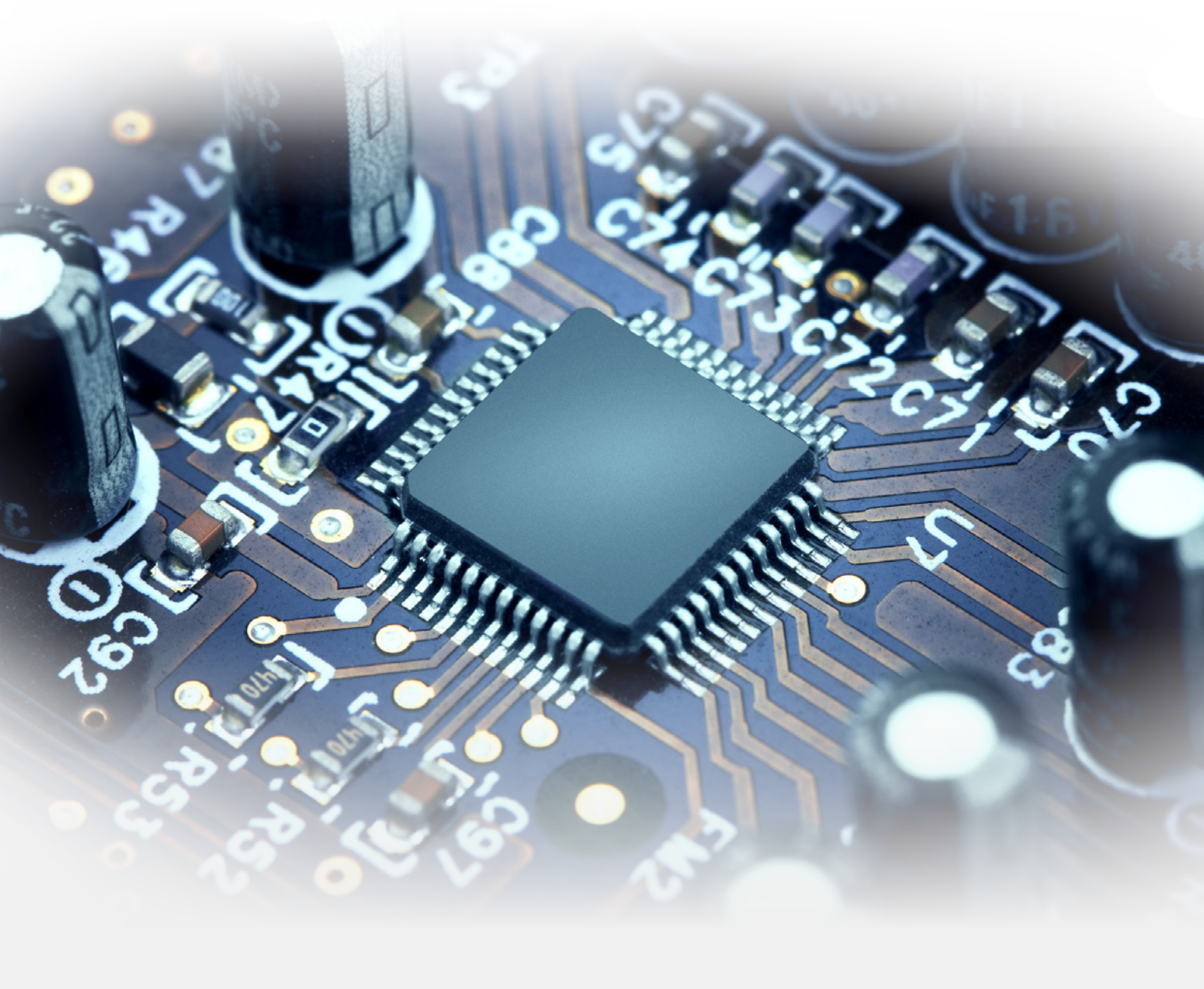


# QUALITY PERFORMS.



**LANXESS Bromine Solutions**  
Flame retardants product guide

**QUALITY WORKS.**

**LANXESS**  
Energizing Chemistry

## A GLOBAL LEADER IN FLAME RETARDANTS INNOVATIVE. RELIABLE. SUSTAINABLE.

Resulting from decades of hard work, innovation and lessons learned, the LANXESS Bromine Solutions of today is positioned to be an excellent partner to our customers for bromine and phosphorus-based flame retardant needs both now and far into the future.

For almost a century, we have helped our customers to meet their flame retardant needs with a broad portfolio of products and solutions. In late 2010, the Great Lakes Solutions business was introduced with a mission to build on its well-established heritage, by introducing differentiated, innovative products and greener, sustainable solutions while maintaining performance and quality.

We are proud of our history and look forward to helping our customers meet future performance, safety and compliance requirements by constantly improving our portfolio with new and improved products for maximum sustainability.



## FLAME RETARDANTS – SAVING LIVES

Fire kills thousands of people each year throughout the world, but many are spared because fires are slowed or never start due to the use of flame retardants. LANXESS is a global leader in flame retardant products and solutions for use in applications such as furniture foam, electronic components, electrical enclosures, building products and more.

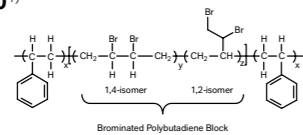
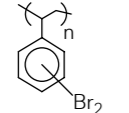
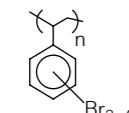
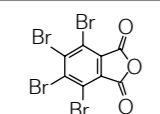
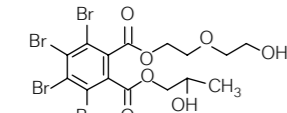
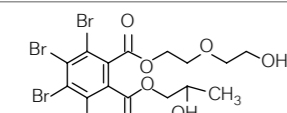
We believe the public should not be forced to choose between environmental and fire safety and that we must have both. Our business demands the highest standards of both fire retardancy performance and environmental sustainability. To meet these increasingly complex challenges, LANXESS offers a wide range of flame retardant solutions that allow OEM's the versatility to meet their individual needs.

Brominated flame retardants are used in a variety of applications from electronic housings to printed circuit boards and electrical connectors to flexible and rigid polyurethane foam. Brominated flame retardants provide optimal processing while maintaining outstanding physical properties in a cost effective manner.

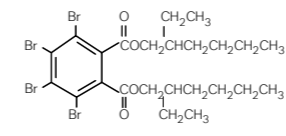
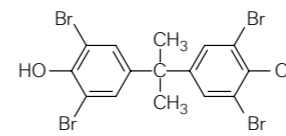
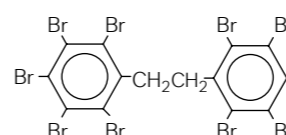
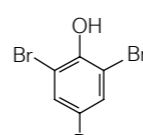




# BROMINE-BASED FLAME RETARDANTS

|  |   | Viscosity/<br>melting<br>range °C | Volatility<br>TGA, Wt. loss<br>@ temp                   | Typical<br>specific<br>gravity | Bulk<br>density<br>g/ml | Solubility<br>(g/100 g solvent @ 25 °C)  |
|--|---|-----------------------------------|---|--------------------------------|-------------------------|--|
| <b>Emerald Innovation® 3000<sup>1)</sup></b><br>Brominated polymeric<br>Bromine content: 64 %  |    | Softening 120                     | 5% @ 255°C<br>10% @ 260°C<br>50% @ 280°C                | 1.9                            | 0.5 (L)<br>0.7 (P)      | Water <0.1<br>Methylene chloride >20<br>Methanol <0.1<br>Styrene >20                                     |
|  | CAS No. 1195978-93-8  |                                   |   |                                |                         |  |
| <b>PDBS-80™</b><br>Poly (dibromostyrene)<br>Formula weight: 50,000<br>Bromine content: 59.0%   |    | Tg: 144                           | 5% @ 368°C<br>10% @ 378°C<br>50% @ 404°C<br>95% @ 544°C | 1.9                            | 1.11 (P)                | Water <0.1<br>Dichloromethane C<br>Toluene C<br>Methanol <0.1<br>MEK 2                                   |
|  | CAS No. 88497-56-7  |                                   |   |                                |                         |  |
| <b>Firemaster® CP44-HF</b><br>Copolymer of dibromostyrene<br>Formula weight: ~16,000<br>Bromine content: 64–65%                            | Proprietary   | Tg: 147                           | 1% @ 316°C<br>5% @ 347°C                                | 2.0                            |                         | Water Insoluble<br>Toluene C<br>Methylene chloride P<br>MEK P<br>Methanol Insoluble<br>Acetone Insoluble |
|  | CAS No. 88497-56-7  |                                   |   |                                |                         |  |
| <b>Firemaster® PBS-64HW</b><br>Poly (dibromostyrene)<br>Formula weight: 40,000<br>Bromine content: 64.0%                                   |   | Tg: 156                           | 5% @ 356°C<br>10% @ 371°C<br>50% @ 401°C                | 2.0                            | 1.25 (P)                | Water <0.1<br>Dichloromethane C<br>Toluene C<br>Methanol <0.1<br>MEK P                                   |
|  | CAS No. 88497-56-7  |                                   |   |                                |                         |  |
| <b>PHT4™</b><br>Tetrabromophthalic anhydride<br>Formula weight: 463.7<br>Bromine content: 68.2%  |  | 274–277                           | 5% @ 229°C<br>10% @ 242°C<br>50% @ 277°C                | 2.9                            | 1.37 (L)<br>2.09 (P)    | Water <0.1<br>Dichloromethane 1<br>Toluene 6<br>Methanol 1.6<br>MEK 2.6                                  |
|  | CAS No. 632-79-1  |                                   |   |                                |                         |  |
| <b>PHT4-Diol™</b><br>Tetrabromophthalate diol<br>Formula weight: 627.9<br>Bromine content: 46.0%   |  | 90,000 cps<br>@ 25°C              | 5% @ 128°C<br>10% @ 166°C<br>50% @ 319°C<br>95% @ 380°C | 1.9                            |                         | Water <0.5<br>Dichloromethane C<br>Toluene C<br>Methanol 9<br>MEK C                                      |
|  | US CAS No. 77098-07-8<br>EU CAS No. 20566-35-2                                      |                                   |   |                                |                         |  |
| <b>PHT4-Diol™ LV</b><br>Tetrabromophthalate diol<br>Formula weight: 627.9<br>Bromine content: 43%  |  | 22,500 cps<br>@ 25°C              | 5% @ 127°C<br>10% @ 151°C<br>50% @ 325°C<br>95% @ 382°C | 1.7                            |                         | Water <0.5<br>Dichloromethane C<br>Toluene C<br>Methanol 9<br>MEK C                                      |
|  | CAS No. 77098-07-8<br>EU CAS No. 20566-35-2   |                                   |   |                                |                         |  |
| <b>Firemaster® 504</b><br>Tetrabromophthalate diol blend<br>Bromine content: 18%<br>(This product is not registered<br>for sale in Europe) | Proprietary   | 350–500 cps<br>@ 25°C             | 5% @ 147°C<br>10% @ 167°C<br>50% @ 211°C                | 1.45                           |                         | Water <0.1<br>Dichloromethane C<br>Toluene C<br>MEK C<br>Methanol C<br>MEK C                             |
|  |   |                                   |   |                                |                         |  |
| <b>Firemaster® 508</b><br>Tetrabromophthalate diol blend<br>Bromine Content: 37%<br>This product is not registered<br>for sale in Europe)  | Proprietary   | 8800 cps<br>@ 25°C                | 5% @ 136°C<br>10% @ 157°C<br>50% @ 285°C                | 1.67                           |                         | Water <0.1<br>Dichloromethane C<br>Toluene C<br>MEK C<br>Methanol C<br>MEK C                             |
|  |   |                                   |   |                                |                         |  |

<sup>1)</sup> Emerald Innovation® 3000 is based on technology licensed from The Dow Chemical Corporation.

|  |   | Viscosity/<br>melting<br>range °C | Volatility<br>TGA, Wt. loss<br>@ temp                   | Typical<br>specific<br>gravity | Bulk<br>density<br>g/ml | Solubility<br>(g/100 g solvent @ 25 °C)  |
|--|---|-----------------------------------|---|--------------------------------|-------------------------|--|
| <b>DP-45™</b><br>Tetrabromophthalate ester<br>Formula weight: 706.1<br>Bromine content: 45%  |    | 1800 cps<br>@ 25°C                | 5% @ 211°C<br>10% @ 226°C<br>50% @ 268°C<br>95% @ 291°C | 1.6                            |                         | Water <0.1<br>Dichloromethane C<br>Toluene C<br>Methanol 5.7<br>MEK C                  |
|  | CAS No. 26040-51-7  |                                   |   |                                |                         |  |
| <b>BA-59P™</b><br>Tetrabromobisphenol A<br>Formula weight: 543.7<br>Bromine content: 59%   |    | 179–182                           | 5% @ 244°C<br>10% @ 261°C<br>50% @ 301°C                | 2.2                            | 0.96 (L)<br>1.36 (P)    | Water <0.1<br>Acetone 225<br>Dichloromethane 27<br>Toluene 6<br>Methanol 80<br>MEK 168 |
|  | CAS No. 79-94-7   |                                   |   |                                |                         |  |
| <b>Firemaster® BZ-54</b><br>Tetrabromophthalic anhydride derivative<br>Bromine content: 54%<br>(This product is not registered<br>for sale in Europe)                      | Proprietary   | 800 cps<br>@ 25°C                 | 5% @ 211°C<br>10% @ 226°C<br>50% @ 268°C<br>95% @ 291°C | 1.7                            |                         | Water <0.1<br>Dichloromethane C<br>Toluene C<br>Methanol 5.7<br>MEK C                  |
|  |   |                                   |   |                                |                         |  |
| <b>Firemaster® 600</b><br>Tetrabromobenzoate ester composition<br>Bromine content: 27%<br>Phosphorus content: 4%<br>(This product is not registered<br>for sale in Europe) | Proprietary Blend   | 200 cps<br>@ 25°C                 | 5% @ 210°C<br>10% @ 226°C<br>25% @ 249°C<br>50% @ 269°C | 1.4                            |                         | Water <0.1<br>Dichloromethane C<br>Toluene 9.47<br>Methanol C<br>MEK C                 |
|  |   |                                   |   |                                |                         |  |
| <b>Firemaster® 602</b><br>Tetrabromobenzoate ester composition<br>Bromine content: 27%<br>Phosphorus content: 4%<br>(This product is not registered<br>or sale in Europe)  | Proprietary Blend   | 200 cps<br>@ 25°C                 | 5% @ 217°C<br>10% @ 234°C<br>25% @ 257°C<br>50% @ 279°C | 1.4                            |                         | Water <0.1<br>Dichloromethane C<br>Toluene 9.40<br>Methanol C<br>MEK C                 |
|  |   |                                   |   |                                |                         |  |
| <b>BC-52™</b><br>Phenoxy-terminated carbonate oligomer<br>of Tetrabromobisphenol A<br>Formula Weight: ~2,500<br>Bromine Content: 52%                                       | Proprietary   | 180–210                           | 5% @ 408°C<br>10% @ 438°C<br>50% @ 480°C                | 2.2                            | 0.61 (L)<br>1.00 (P)    | Water <0.1<br>Dichloromethane C<br>Toluene 14<br>Methanol <0.1<br>MEK C                |
|  | CAS No. 94334-64-2  |                                   |   |                                |                         |  |
| <b>BC-58™</b><br>Phenoxy-terminated carbonate oligomer<br>of tetrabromobisphenol A<br>Formula weight: ~3,500<br>Bromine content: 58%                                       | Proprietary   | 200–230                           | 5% @ 380°C<br>10% @ 423°C<br>50% @ 475°C                | 2.2                            | 0.66 (L)<br>1.02 (P)    | Water <0.1<br>Dichloromethane C<br>Toluene 14<br>Methanol <0.1<br>MEK C                |
|  | CAS No. 71342-77-3  |                                   |   |                                |                         |  |
| <b>Firemaster® 2100R</b><br>Decabromodiphenyl ethane<br>Formula weight: 971.2<br>Bromine content: 81-82%   |  | 348–353                           | 1% @ 314°C<br>5% @ 344°C<br>50% @ 402°C<br>90% @ 423°C  | 3.2                            | 1.19 (L)<br>1.39 (P)    | Water <0.01<br>Dichloromethane <0.01<br>Toluene <0.01<br>Methanol <0.01<br>MEK <0.01   |
|  | CAS No. 84852-53-9  |                                   |   |                                |                         |  |
| <b>PH-73FF™</b><br>2,4,6 Tribromophenol<br>Formula weight: 330.8<br>Bromine content: 72.5%   |  | 91–95                             | 5% @ 122°C<br>10% @ 134°C<br>50% @ 167°C<br>95% @ 183°C | 2.2                            | 1.4 (L)<br>1.41 (P)     | Water <0.1<br>Dichloromethane 36<br>Toluene 50<br>Methanol 84<br>MEK 225               |
|  | CAS No. 118-79-6  |                                   |   |                                |                         |  |

## Notes:

TGA:  
10 mg @ 10°C/min., N<sub>2</sub>

Bulk Density:  
L denotes loose  
P denotes packed

Solubility:  
C denotes complete solubility (100 g/100 ml)  
P denotes partial solubility



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**Customers in the USA are kindly  
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Unless specified to the contrary, the values given have been established on standardized test specimens. The figures should be regarded as guide values only and not as binding minimum values. Kindly note that the results refer exclusively to the specimens tested. Under certain conditions, the test results established can be affected to a considerable extent by the processing conditions and manufacturing process.

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